

IN THE CLAIMS

This listing of the claim will replace all prior versions and listings of claim in the present application.

Listing of Claims

Claims 1-20 (canceled).

21. (currently amended) A storage system comprising:

a plurality of host adaptors coupled to at least one host device, which form interfaces for the host device;

a plurality storage devices for storing therein data transferred from the host device;

a plurality of disk adaptors coupled to said storage devices, which form interfaces for said storage devices;

a cache for temporarily storing therein data transferred between said host adaptors and said disk adaptors;

two buses, coupled to said host adaptors, said disk adaptors, and said cache, which transfer data among said host adaptors, said disk adaptors, and said cache,

wherein said two buses operate as a pair of buses having a transfer ability larger than one of said two buses;

a memory for storing information indicating status which of said two buses is available for use due to a failure in the other of said two buses,

wherein each of said host adaptors includes a format converter for converting data of a count key data (CKD) format, in a case where said host adaptor receives the data of the CKD format from the host device, into data of a fixed block architecture (FBA) format suitable for storage in said storage devices before being

stored in said cache and sending the converted data of the FBA format to said cache through said two buses,

wherein said cache stores the converted data of the FBA format converted by said format converter, and

wherein upon failure one of said two buses is used based on said status information stored in said memory.

Claim 22 (canceled).

23. (previously presented) A storage system according to claim 21, wherein said memory can be referred to by an external processor.

24. (currently amended) A storage system comprising:

a plurality of host adaptors coupled to at least one host device, which form interfaces for the host device;

a plurality of storage devices for storing therein data transferred from the host device;

a plurality of disk adaptors coupled to said storage devices, which form interfaces for said storage devices;

a plurality of caches for temporarily storing therein data transferred between said host adaptors and said disk adaptors;

two buses, coupled to said host adaptors, said disk adaptors, and said caches, which transfer data among said host adaptors, said disk adaptors, and said caches, wherein said two buses operate as a pair of buses having a transfer ability

larger than one of said two buses;

a memory for storing status information indicating which of said two buses is available for use due to a failure in the other of said two buses,

wherein each of said host adaptors includes a format converter for converting data of a count key data (CKD) format, in a case where said host adaptor receives the data of the CKD format from a host device, into data of a fixed block architecture (FBA) format suitable for storage in said storage devices before being stored in said caches and sending the converted data of the FBA format to said caches through said two buses,

wherein said caches store the converted data of the FBA format converted by said format converter and

wherein upon failure one of said two buses is used based on said status information stored in said memory.

Claim 25 (canceled).

26. (previously presented) A storage system according to claim 24, wherein said memory can be referred to by an external processor.

27. (currently amended) A storage system comprising:

a plurality of host adaptors, coupled to at least one host device, which form interfaces for the host device;

a plurality of storage devices for storing therein data transferred from the host device;

a plurality of disk adaptors, coupled to said storage devices, which form interfaces for said storage devices;

at least one cache memory unit for temporarily storing therein data transferred between said host adaptors and said disk adaptors;

at least one path, coupled to said host adaptors, said disk adaptors and said at least one cache memory unit, which transfers data among said host adaptors, said disk adaptors and said at least one cache memory unit, and

wherein each said host adaptors includes a format converter for converting data of a count key data (CKD) format, in a case where said host adaptor receives the data of the CKD format from said host device, into data of a fixed block architecture (FBA) format suitable for said storage devices before being stored in said at least one cache memory unit, and sending the converted data of the FBA format to said at least one cache memory unit through said at least one path, and said at least one cache memory unit stores the converted data of the FBA format converted by said format converter.

Claim 28 (canceled).

29. (previously presented) A storage system according to claim 27, further comprising:

a shared memory unit which stores therein control information for controlling said host adaptors, said disk adaptors and said at least one cache memory unit.

30. (previously presented) A storage system according to claim 29,

wherein said at least one cache memory unit has a plurality of cache memories arranged in a duplexed form, and said shared memory unit has a plurality of shared memories arranged in a duplexed form.

31. ((previously presented)) A storage system according to claim 27, wherein said at least one path is a duplexed common bus.

32. (previously presented) A storage system according to claim 31, wherein said duplexed common bus includes:

a control information bus, coupled to said host adaptors and said disk adaptors, which transfers control information, and

a data transfer bus, coupled to said host adaptors, said disk adaptors and said at least one cache memory unit, which transfers data among said host adaptors, said disk adaptors and said at least one cache memory unit.

Claim 33 (canceled).

34. (previously presented) A storage system according to claim 27, wherein said format converter converts data of the CKD format into data of the FBA format and adds a longitudinal redundancy check (LRC) code to the data of the FBA format thus converted, and said format converter fetches a part of physical address information data sent from said host device and generates a logical address of a logical storage device which is formed by said storage devices.

35. (previously presented) A storage system according to claim 27, wherein said host adaptors receive physical address information, data of the CKD format and a cyclic redundancy check (CRC) code on a storage space of said storage devices, and

wherein said format converter converts data of the CKD format into data of the FBA format, fetches the physical address as a part of the data and generates a logical address on said storage devices, and then writes the data thus converted into said cache memory unit through said path.

36. ((previously presented)A storage system according to claim 27, wherein said format converter, at a time of writing said data thus converted into said at least one cache memory unit, adds an error correction code (ECC) to said data and then writes said data thus added with the ECC into said at least one cache memory unit, and

wherein when said disk adaptors receive the data thus converted from said at least one cache memory unit through said at least one path, said disk adaptors add a CRC code to said data received and write said data thus added with the CRC code into said storage devices.

37. (currently amended)A storage system comprising:
a plurality of host adaptors, coupled to at least one host device, which form interfaces for the host device;
a plurality of storage devices for storing therein data transferred from the host device;

a plurality of disk adaptors, coupled to said storage devices, which form interfaces for said storage devices;

at least one cache memory unit for temporarily storing therein data transferred between said host adaptors and said disk adaptors; and

at least one path, coupled to said host adaptors, said disk adaptors and said at least one cache memory unit, which transfers data among said host adaptors, said disk adaptors and said at least one cache memory unit,

wherein each of said host adaptors includes a format converter for converting data of a count key data (CKD) format, in a case where said host adaptor receives the data of the CKD format from the host device, into data of a fixed block architecture (FBA) format suitable for said storage devices before being stored in said at least one cache memory unit, and sending the converted data of the (FBA) format to said at least one path; and

wherein said at least one cache memory unit then stores therein the converted data of the FBA format converted by said format converter and sent through said at least one path.

38. (previously presented) A storage system according to claim 37, wherein said at least one path is a duplexed common bus.

39. (previously presented) A storage system according to claim 38, wherein said duplexed common bus includes:

a control information bus, coupled to said host adaptors and said disk adaptors, which transfers control information; and

a data transfer bus, coupled to said host adaptors, said disk adaptors and said at least one cache memory unit, which transfers data among said host adaptors, said disk adaptors and said at least one cache memory unit.

Claim 40 (canceled).

41. ((previously presented) A storage system according to claim 37, wherein said format converter converts data of the CKD format into data of the FBA format and adds a Longitudinal Redundancy Check (LRC) code to the data of the FBA format thus converted, and said format converter fetches a part of physical address information data sent from the host device and generates a logical address of a logical storage device which is formed by said storage devices.

42. (previously presented) A storage system according to claim 37, wherein said host adaptors receive physical address information, data of the CKD format and a Cyclic Redundancy Check (CRC) code on a storage space of said storage devices, and

wherein said format converter converts data of the CKD format into data of the FBA format, fetches the physical address as a part of the data and generates a logical address on said storage devices, and then writes the data thus converted into said at least one cache memory unit through said at least one path.

43. (currently amended) A storage system comprising:

at least one adaptor, coupled to at least one host device and to a plurality of

storage devices, which forms an interface for said at least one host device and said storage devices,

wherein said storage devices store therein data transferred from said at least one host device;

at least one cache memory unit for temporarily storing therein data transferred from said at least one adaptor; and

at least one path, coupled to said at least one adaptor and said at least one cache memory unit, which transfers data between said at least one adaptor and said at least one cache memory unit,

wherein said at least one adaptor includes a format converter for converting data of a count key data (CKD) format, in a case where said host adaptor receives the data of the CKD format from said at least one host device, into data of a fixed block architecture (FBA) format suitable for said storage devices before being stored in said at least one cache memory unit, and sending the converted data of the FBA format to said at least one cache memory unit through said at least one path, and said at least one cache memory unit stores the converted data of the FBA format converted by said format converter.

44. (previously presented) A storage system according to claim 43, further comprising:

a shared memory unit which stores therein control information for controlling said at least one adaptor and said at least one cache memory unit.

45. (previously presented) A storage system according to claim 44,

wherein said at least one cache memory unit has a plurality of cache memories arranged in a duplexed form, and said shared memory unit has a plurality of shared memories arranged in a duplexed form.

46. (previously presented) A storage system according to claim 43, wherein said at least one path is a duplexed common bus.

47. (previously presented) A storage system according to claim 46, wherein said duplexed common bus includes:

a control information bus, coupled to said at least one adaptor, which transfers control information, and

a data transfer bus, coupled to said at least one adaptor and said at least one cache memory unit, which transfers data among said at least one adaptor and said at least one cache memory unit.

48. (previously presented) A storage system according to claim 43, wherein said format converter converts data of the CKD format into data of the FBA format and adds a longitudinal redundancy check (LRC) code to the data of the FBA format thus converted, and said format converter fetches a part of physical address information data sent from said host device and generates a logical address of a logical storage device which is formed by said storage devices.

49. (previously presented) A storage system according to claim 43, wherein said at least one adaptor receives physical address information, data of the

CKD format and a cyclic redundancy check (CRC) code on a storage space of said storage devices, and

wherein said format converter converts data of the CKD format into data of the FBA format, fetches the physical address as a part of the data and generates a logical address on said storage devices, and then writes the data thus converted into said at least one cache memory unit through said at least one path.

50. (previously presented) A storage system according to claim 43, wherein said format converter, at a time of writing the data thus converted into said at least one cache memory unit, adds an error correction code (ECC) to said data and then writes said data thus added with the ECC into said at least one cache memory unit, and

wherein when said at least one adaptor receives the data thus converted from said at least one cache memory unit through said at least one path, said at least one adaptor adds a CRC code to said data received and writes said data thus added with the CRC code into said storage device.

51. (currently amended) A storage system comprising:

at least one adaptor, coupled to at least one host device and to a plurality of storage devices, which forms an interface for said at least one host device and said storage devices,

wherein said storage devices store therein data transferred from said at least one host device;

at least one cache memory unit for temporarily storing therein data transferred

from said at least one adaptor; and

at least one path, coupled to said at least one adaptor and said at least one cache memory unit, which transfers data between said at least one adaptor and said at least one cache memory unit,

wherein said at least one adaptor includes a format converter for converting data of a count key data (CKD) format, in a case where said host adaptor receives the data of the CKD format from said at least one host device before being stored in said at least one cache memory unit, into data of a fixed block architecture (FBA) format suitable for said storage devices, and

sending the converted data of the FBA format to said at least one path, and

wherein said at least one cache memory unit then stores therein the converted data of the FBA format converted by said format converter and sent through said at least one path.

52. (previously presented) A storage system according to claim 51, wherein said at least one path is a duplexed common bus.

53. (previously presented) A storage system according to claim 52, wherein said duplexed common bus includes:

a control information bus, coupled to said at least one adaptor, which transfers control information; and

a data transfer bus, coupled to said at least one adaptor and said at least one cache memory unit, which transfers data among said at least one adaptor and said at least one cache memory unit.

54. (previously presented) A storage system according to claim 51, wherein said format converter converts data of the CKD format into data of the FBA format and adds a longitudinal Redundancy Check (LRC) code to the data of the FBA format thus converted, and said format converter fetches a part of physical address information data sent from said host device and generates a logical address of a logical storage device which is formed by said storage devices.

55. (previously presented) A storage system according to claim 51, wherein said at least one adaptor receives physical address information, data of the CKD format and a Cyclic Redundancy Check (CRC) code on a storage space of said storage devices, and

wherein said format converter converts data of the CKD format into data of the FBA format, fetches the physical address as a part of the data and generates a logical address on said storage devices, and then writes the data thus converted into said cache memory unit through said at least one path.